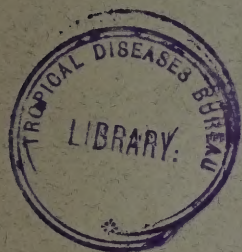


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THE DIFFERENTIAL BLOOD COUNT
IN DENGUE

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THE DIFFERENTIAL BLOOD COUNT IN DENGUE.

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THE epidemic of dengue which prevailed in Calcutta during the past hot weather followed the course usually attributed to this disease of appearing first in coast towns and travelling inland by way of the valleys of the great rivers. I do not know when the first cases were recognised in Calcutta, but the disease appeared in Gauhati, Assam, about the fourth week in May, when I saw a typical case with a remarkably well developed rash in a European. By the end of the month two other Europeans living in the next bungalow had been attacked and nearly all their servants. I heard soon afterwards that there were numerous cases in the town and that the disease was widely prevalent in the lower valley of the Brahmaputra, and, on enquiring at the Civil Hospital from the medical subordinates who were in charge of the out-patient department, I learnt that cases of fever accompanied by headache and lumbar pain were presenting themselves daily. At my request a number of convalescent cases were brought before me; their descriptions of their symptoms showed that the diagnosis of dengue was correct, and on examining films of the blood the changes which I shall describe below and which I now regard as characteristic of the convalescent stage of the disease were found in every case.

During June, July and August I saw numerous cases and was able to confirm my previous observations. Towards the end of August the cases became less numerous, during September only a few scattered cases occurred and by the end of the month the epidemic had entirely ceased.

CLINICAL COURSE.

I do not propose to say much on the aspect of the subject. Major Megaw, I.M.S., in his paper "Are Seven-Day Fever and Three-Day Fever forms of Dengue" (*Indian Medical Gazette*, January 1909) has exhaustively analysed the clinical features of the diseases known by these three titles, and has summarised with the greatest lucidity the evidence for their identity. He lays special stress on the variability of the disease in regard to every symptom and the cases which I have seen bear out this contention. The duration and the character of the fever are the most variable points of all and in illustration of this I append a series of thirteen charts arranged in order of duration of the fever :—

Fever lasting 2 days	...	Charts I, II, III.
" 3 "	...	" IV-VII.
" 4 "	...	" VIII-X.
" 5 "	...	" XI-XII.
" 6 "	...	" XIII.

Most of these cases it will be noticed fall into the second class in Megaw's classification of the fever—"Short fever type." No. IV is the "Interrupted Fever type" though not a good example. No. XI is the "Saddle-back type"; whilst Nos. XII and XIII may be regarded as the "Continued Fever type" in which the secondary rise is merged into the primary fever. The series begins with charts typical of the "Three-Day Fever" of Northern India and ends with charts which correspond fairly closely with the text-book accounts of the fever in dengue.

Headache and pain in the loins were constant and characteristic in all the cases which I saw and joint pains were often present. All recent writers on this subject agree that the severe "Break bone" pains of the text-books are rarely complained of. Wimberley (*Indian Medical Gazette*, August 1910) never saw this symptom; in the Brisbane and Philippine epidemics it was rare; Monro (*Indian Medical Gazette*, September

1911) saw no instance in 109 cases in the 27th Punjabis at Alipore, nor do McCarrison or Wall describe it as characteristic of the Chitral fever. My experience is the same, but that the pain does occasionally assume this form I can vouch for, as I saw two cases in Europeans in which this very term was used by the patients themselves, who, when questioned, assured me that they had not only never read any medical book but had never before heard of dengue. One of these patients in the letter asking me to come and see him wrote —“It began yesterday with a slight pain in my left foot.....to-day the whole of my body feels as if there isn't a single whole bone in it.” Does not this read like a plagiarism from Manson?

The rash is generally agreed to be a variable feature, it is in my experience much more difficult to detect in Indian patients than in Europeans and Eurasians, the few cases which I saw of the latter races all had well marked rashes appearing about the 5th or 6th day, whereas in Indian cases it was either never detected at all, or was very slight and evanescent. The appearance of the rash was always immediately followed by the disappearance of the pains.

THE BLOOD CHANGES.

The recorded blood changes in dengue are (1) a marked leucopenia setting in after the 2nd or 3rd day of the fever; (2) a diminution of the polymorphonuclears; (3) a marked relative and some actual increase of the large and small mononuclears.

(1) Leucopenia I find to be invariable during the febrile stage and is usually well marked after the second day. Lack of time prevented me from counting the total number of leucocytes except in a few cases, but in those which were counted I found the number of leucocytes to be 3000-4000 per cmm. From the appearance of the films I judged in the other cases that the numbers present did not differ widely from the above.

(2) The reduction in the polymorphonuclears becomes manifest at the same time as the leucopenia and continues to progress as other varieties of leucocytes increase during the next few days.

(3) The large mononuclears (large hyalines) rarely show any wide departure from the normal in most cases they are slightly diminished in numbers. The lymphocytes, both large and small, at first relatively

increased from the diminution of the polymorphonuclears, show an absolute increase towards the end of the week. The distinction between large and small lymphocytes in this disease is rather arbitrary, as all sizes are met with from 6μ — 12μ . A common variety met with in this disease is slightly larger than the ordinary small lymphocytes with a round or slightly indented nucleus, placed a little eccentrically, with a clear blue protoplasm (Leishman's stain) containing several coarse basophil granules. These cells are often met with in malarial bloods, but are especially common in this disease and are evidently associated with the lymphocytic increase which occurs towards the end of the week. The difficulty in classifying them is increased by the fact that owing to the leucopenia, the differential count has to be done at the edges of the film where the cells are always liable to be distorted and hard to recognise.

In addition to these well recognised changes there occurs also another, which, as far as I know, has not hitherto been described in dengue, and to which it is the purpose of this paper to draw attention. This change consists in a variable amount of eosinophilia always present, and, sometimes dominating the whole blood picture, which sets in about the 4th—6th day and is well marked by the 10th day, and persists for some time afterwards. In the following 12 cases the first blood count was done during the febrile stage, and a second and in some cases a third and fourth during the convalescent stage.

No. I. Indian. Fever lasted 3 days, no rash. Chart No. VII.

1st Count, 31st July, 1912, 2nd day—

Polymorphonuclears	... 61 per cent.	
Large Mononuclears	... 3.5 per cent.	
Large Lymphocytes	... 16 "	} = 33.5%
Small Lymphocytes	... 17.5 "	
Eosinophiles	... 2 "	

2nd Count, 9th August, 1912, 11th day—

Polymorphonuclears	... 37.5 per cent.	
Large Mononuclears	... 2 "	
Large Lymphocytes	... 17 "	} = 35.5%
Small Lymphocytes	... 18.5 "	
Eosinophiles	... 25 "	

Leucopenia marked in both films.

No. 2. Indian. Fever lasted 2 days. No rash.
Chart I

1st Count, 30th July, 1912, 2nd day—

Polymorphonuclears	... 58 per cent.	
Large Mononuclears	... 8 "	
Large Lymphocytes	... 13.5 "	} = 30%
Small Lymphocytes	... 16.5 "	
Eosinophiles	... 4 "	

2nd Count, 3rd August, 1912, 6th day--

Polymorphonuclears	... 41 per cent.	
Large Mononuclears	... 2 "	
Large Lymphocytes	... 18 "	} = 38%
Small Lymphocytes	... 20 "	
Eosinophiles	... 19 "	

Leucopenia in both films.

No. 3. European. Fever lasted 3 days. Severe pain,
well marked typical rash appeared 5th day. Chart VI.

1st Count, 24th July, 1912, 2nd day. Marked leuco-
penia.

Polymorphonuclears	... 77 per cent.	
Large Mononuclears	... 3.5 "	
Large Lymphocytes	... 7 "	} = 13.5%
Small Lymphocytes	... 6.5 "	
Eosinophiles	... 6 "	

2nd Count, 28th July, 1912, 6th day. Marked leuco-
penia.

Polymorphonuclears	... 32.5 per cent.	
Large Mononuclears	... 3.5 "	
Large Lymphocytes	... 17 "	} = 37%
Small Lymphocytes	... 20 "	
Eosinophiles	... 27 "	

3rd Count, 4th August, 1912, 13th day. Leucocytes
nearly normal numbers.

Polymorphonuclears	... 59 per cent.	
Large Mononuclears	... 2 "	
Large Lymphocytes	... 8 "	} = 16%
Small Lymphocytes	... 8 "	
Eosinophiles	... 23 "	

No. 4. Anglo-Indian. Fever lasted 4 days. Pains
severe, well marked typical rash appeared 5th day.
Chart X.

1st Count, 4th August, 1912, 2nd day—

Polymorphonuclears	... 79.5 per cent.	
Large Mononuclears	... 9.5 "	
Large Lymphocytes	... 6.5 "	} = 0%
Small Lymphocytes	... 3.5 "	
Eosinophiles	... 1 "	

2nd Count, 10th August, 1912, 8th day—

Polymorphonuclears	... 60.5 per cent.	
Large Mononuclears	... 5 "	
Large Lymphocytes	... 12.5 "	} = 20%
Small Lymphocytes	... 7.5 "	
Eosinophiles	... 14.4 "	

Leucopenia marked in both films.

No. 5. Indian. Fever lasted 3 days. Pains severe.
No rash.

1st Count, 4th July, 1912, 2nd day —

Polymorphonuclears	... 78 per cent.	
Large Mononuclears	... 6.5 "	
Large Lymphocytes	... 9 "	} = 15.5%
Small Lymphocytes	... 6.5 "	
Eosinophiles	... 0 "	

2nd Count, 21st July, 1912, 19th day—

Polymorphonuclears	... 68 per cent.	
Large Mononuclears	... 5 "	
Large Lymphocytes	... 8 "	} = 20%
Small Lymphocytes	... 12 "	
Eosinophiles	... 7 "	

Leucopenia in both films.

No. 6. Indian. Fever lasted 3 days. Headache severe,
but loin pains slight. No rash. Chart IV.

1st Count, 28th July, 1912, 2nd day. Moderate leucopenia.

Polymorphonuclears	... 57.5 per cent.	
Large Mononuclears	... 11 "	
Large Lymphocytes	... 15 "	} = 31%
Small Lymphocytes	... 16.5 "	
Eosinophiles	... 0 "	

2nd Count, 8th August, 1912, 13th day. Slight leucocytosis.

Polymorphonuclears	... 75.4	per cent.	
Large Mononuclears	... 6	"	
Large Lymphocytes	... 9	"	} = 13%
Small Lymphocytes	... 4	"	
Eosinophiles	... 5.6	"	

No. 7. Indian. Fever lasted 2 days. Pains severe, well marked typical rash appeared 6th day. Chart III.

1st Count, 30th July, 1912, 3rd day—

Polymorphonuclears	... 56	per cent.	
Large Mononuclears	... 2	"	
Large Lymphocytes	... 4.5	"	} = 39%
Small Lymphocytes	... 34.5	"	
Eosinophiles	... 3	"	

2nd Count, 4th August, 1912, 8th day—

Polymorphonuclears	... 55.5	per cent.	
Large Mononuclears	... 4.5	"	
Large Lymphocytes	... 11	"	} = 30%
Small Lymphocytes	... 19	"	
Eosinophiles	... 10	"	

3rd Count, 16th August, 1912, 20th day—

Polymorphonuclears	... 56.5	per cent.	
Large Mononuclears	... 3	"	
Large Lymphocytes	... 15	"	} = 34%
Small Lymphocytes	... 19	"	
Eosinophiles	... 6.5	"	

No marked deviation from normal numbers of the leucocytes in any of the films.

No. 8. Indian. Duration of fever uncertain. Pains typical. No rash.

1st Count, 22nd July, 1912, 3rd day—

Polymorphonuclears	... 82	per cent.	
Large Mononuclears	... 5.5	"	
Large Lymphocytes	... 2.5	"	} = 12.5%
Small Lymphocytes	... 10	"	
Eosinophiles	... 0	"	

2nd Count, 30th July, 1912 11th day—

Polymorphonuclears	... 55	per cent.	
Large Mononuclears	... 3	"	
Large Lymphocytes	... 11	"	} = 31%
Small Lymphocytes	... 20	"	
Eosinophiles	... 11	"	

Marked leucopenia in both films.

No. 9. India. Fever lasted 4 days. Severe pains.
No rash. Chart VIII.

1st Count, 3rd July 1912, 3rd day. Total No. of
leucocytes 3700 per cmm.

Polymorphonuclears	...	80.5	per cent.	
Large Mononuclears	...	3.5	"	
Large Lymphocytes	...	6	"	{ = 16 %.
Small Lymphocytes	...	10	"	
Eosinophiles	...	0	"	

2nd Count, 8th July 1912, 8th day. Total No. of
leucocytes approximately the same.

Polymorphonuclears	...	61.5	per cent.	
Large Mononuclears	...	9	"	
Large Lymphocytes	...	15	"	{ = 22.5 %.
Small Lymphocytes	...	7.5	"	
Eosinophiles	...	7	"	

No. 10. Indian. Duration of fever about 3 days.
Typical pains. No rash.

1st Count, 3rd day—

Polymorphonuclears	...	75	per cent.	
Large Mononuclears	...	10.5	"	
Large Lymphocytes	...	3	"	{ = 9.5 %.
Small Lymphocytes	...	6.5	"	
Eosinophiles	...	5	"	

2nd Count, 15th day—

Polymorphonuclears	...	73	per cent.	
Large Mononuclears	...	4	"	
Large Lymphocytes	...	13	"	} = 18%.
Small Lymphocytes	...	5	"	
Eosinophiles	...	5	"	
Both slides showed leucopenia.				

No. 11. Indian. Mild attack. No rash.

1st Count, 4th day—

Polymorphonuclears	...	42	per cent.	
Large Mononuclears	...	12	"	
Large Lymphocytes	...	29	"	{ = 46 %.
Small Lymphocytes	...	17	"	
Eosinophiles	...	0	"	

2nd Count, 13th day—

Polymorphonuclears	...	54.5	per cent.	
Large Mononuclears	...	2.5	"	
Large Lymphocytes	...	17	"	{ = 39 %.
Small Lymphocytes	...	22	"	
Eosinophiles	...	4	"	

No. 12. Chinaman. Mild attack. No rash. Fever lasted 2 days. Chart II.

1st Count, 15th August 1912, 3rd day. Total leucocytes 4,400 per cmm.

Polymorphonuclears	...	60	per cent.	
Large Mononuclears	...	8	"	
Large Lymphocytes	...	16	"	{ = 30.5%.
Small Lymphocytes	...	14.5	"	
Eosinophiles	...	1.5	"	

2nd Count, 16th August 1912, 4th day.

Polymorphonuclears	...	59	per cent.	
Large Mononuclears	...	4.5	"	
Large Lymphocytes	...	18.5	"	{ = 34.5%.
Small Lymphocytes	...	16	"	
Eosinophiles	...	2	"	

3rd Count, 17th August 1912, 5th day Leucocytes increasing in numbers.

Polymorphonuclears	...	63	per cent.	
Large Mononuclears	...	2.75	"	
Large Lymphocytes	...	14	"	{ = 29.75%
Small Lymphocytes	...	15.75	"	
Eosinophiles	...	4.5	"	

4th Count 19th August 1912, 7th day.

Polymorphonuclears	...	63	per cent.	
Large Mononuclears	...	2	"	
Large Lymphocytes	...	9	"	{ = 27%
Small Lymphocytes	...	18	"	
Eosinophiles	...	8	"	

The next series of counts are from out-patients seen at various stages after the subsidence of the fever, with the exception of No. 13 which was seen during the febrile stage. Temperature charts were, therefore, unobtainable. Only one count could be done, as the patients were either lost sight of, or else the count was done so late in convalescence that a second count did not appear likely to be of much interest. It will be noticed that, like the convalescent counts in the first

series, every count (except the one done during the acute stage) shows an abnormal percentage of eosinophiles.

No. 13. Indian. 2nd day—

Polymorphonuclears	...	91 per cent.
Large Mononuclears	...	3 "
Large Lymphocytes	...	4 "
Small Lymphocytes	...	0.5 "
Eosinophiles	...	1.5 "
Marked leucopenia. An unusual count.		

No. 14. Indian. 5th day.

Polymorphonuclears	...	65.5 per cent.
Large Mononuclears	...	3 "
Large Lymphocytes	...	11 "
Small Lymphocytes	...	12 "
Eosinophiles	...	8.5 "

No. 15. Indian. Fever lasted 2 days. Typical rash appeared on 4th day.

Count 5th day—

Polymorphonuclears	...	70.5 per cent.
Large Mononuclears	...	3.5 "
Large Lymphocytes	...	5 "
Small Lymphocytes	...	8 "
Eosinophiles	...	13 "

No. 16. Indian. Duration of fever uncertain.

Count 6th day—

Polymorphonuclears	...	15 per cent.
Large Mononuclears	...	0 "
Large Lymphocytes	...	1 "
Small Lymphocytes	...	5 "
Eosinophiles	...	79 "

It is most regrettable that this patient was lost sight of. The count is a most unusual one and there may have been some other factor concerned in the production of this enormous eosinophilia.

No. 17. Indian. Fever lasted 4 days. Pain severe. No rash.

Count 6th day. Marked leucopenia.

Polymorphonuclears	...	53 per cent.
Large Mononuclears	...	5 "
Large Lymphocytes	...	3 "
Small Lymphocytes	...	21 "
Eosinophiles	...	18 "

No. 18. Indian. Fever lasted 3 days Pain severe
and still persisting on 7th day. No rash.

Count 7th day—

Polymorphonuclears	...	54 per cent.
Large Mononuclears	...	1·5 "
Large Lymphocytes	...	2·5 "
Small Lymphocytes	...	12·5 "
Eosinophiles	...	29·5 "

No. 19. European. Fever lasted 7 days Pain not
very severe. Transitory rash on 6th day. Diarrhoea
during the last 4 days of the fever.

Count 8th day. Leucocytes approximately normal
numbers.

Polymorphonuclears	...	74·25 per cent.
Large Mononuclears	...	1·25 "
Large Lymphocytes	...	4 "
Small Lymphocytes	...	13·75 "
Eosinophiles	...	6·75 "

No. 20. Indian. Mild attack. No rash.

Count 9th day—

Polymorphonuclears	...	55 per cent.
Large Mononuclears	...	7·5 "
Large Lymphocytes	...	13·5 "
Small Lymphocytes	...	9 "
Eosinophiles	...	15 "

2nd Count 21st day—

Polymorphonuclears	...	68 per cent.
Large Mononuclears	...	8 "
Large Lymphocytes	...	7 "
Small Lymphocytes	...	7 "
Eosinophiles	...	10 "

Marked leucopenia in both slides.

No. 21. Indian. Fever lasted 3 days. Severe pains.
No rash.

Count 10th day, marked leucopenia.

Polymorphonuclears	...	54 per cent.
Large Mononuclears	...	10·5 "
Large Lymphocytes	...	12·5 "
Small Lymphocytes	...	18 "
Eosinophiles	...	5 "

No. 22. Indian. Typical pains No rash.

Count 11th day—

Polymorphonuclears	...	78·5	per cent.
Large Mononuclears	...	0·5	„
Large Lymphocytes	...	3	„
Small Lymphocytes	...	11	„
Eosinophiles	...	7	„

No. 23. Indian. Severe attack. No rash. Chart No. XIII.

Count 12th day—

Polymorphonuclears	...	40	per cent.
Large Mononuclears	...	2·5	„
Large Lymphocytes	...	13·5	„
Small Lymphocytes	...	31·5	„
Eosinophiles	...	12·5	„

No. 24. Indian. Fever lasted 4 days. Severe pains. No rash.

Count 13th day. Moderate leucopenia.

Polymorphonuclears	...	60·5	per cent.
Large Mononuclears	...	3	„
Large Lymphocytes	...	6·5	„
Small Lymphocytes	...	12	„
Eosinophiles	...	18	„

The average eosinophiles percentage of the first counts in the first series was 17 per cent., and of the later counts in this series 13·4 per cent. In arriving at these figures one case in which the eosinophiles never rose above 4 per cent. is omitted, as also one case in which it was 5 per cent. in both counts, these figures being within the limits of normal variation. Adding the figures of the eosinophiles counts of the second series to those of the later counts of the first series the average is 13·8 per cent., after omitting one case in the acute stage, one in which the eosinophiles were only 5 per cent., and one in which they were 79 per cent., it being doubtful whether the attack of dengue was the sole causative fact in this case.

The 24 cases which furnished the material for these observations were in no way selected. The series might have been made much larger had time, and the pressure of other duties permitted. They are practically a consecutive series, and it will be seen that in every single case

(with the exception of No. 13 where a second count was not done) there was an increase in the eosinophiles during the postfebrile stage of the disease; although in three cases it did not exceed 5 per cent., in all the other cases it averaged 13·4 per cent.—13·8 per cent.

In several cases the faeces were carefully searched microscopically for the ova of parasites with negative results, nor was any other possible cause of the eosinophilia ever found. That it occurs at about the same time as the rash appears or should appear is noteworthy, but I found no difference in the amount of eosinophilia between those cases in which a rash was observed and those in which it was absent.

In most cases only 200 leucocytes were counted, this was due to the leucopenia, which rendered the counting of any larger number a lengthy and tedious process, and would usually have involved the examination of a second slide. Major Rogers, I.M.S., has pointed out that by counting only the edges of a film one gets figures in which the polymorphonuclears and the eosinophiles are unduly high, the mononuclear elements preponderating in the parts of the film rather further from the edges. This source of fallacy, however, does not effect counts where there is extreme leucopenia, as it will be found in all cases that starting from one edge of the film one has worked well into the central parts of the film by the time 200 leucocytes have been counted.

Leucopenia with rapidly developing eosinophilia is then the characteristic blood change towards the end of the first week of an attack of dengue. As far as I know such a condition does not occur uniformly in any other disease, and may be looked upon as diagnostic. Unfortunately it is too late in occurrence to be of use for diagnosis when most wanted—during the first few days of the fever. The principal utility, however, of this observation, if confirmed, will be in the assistance it will afford in setting the identity or otherwise of "Three-Day Fever" and "Seven-Day Fever" with dengue. Dengue is a disease so variable in every symptom and sign that, failing the isolation of the actual parasite, it has not been possible to settle upon any characteristic sign and use it as a test of the identity of doubtful cases. There can be no reasonable doubt that the epidemic which visited Calcutta this summer was dengue, nor have I any doubt that the cases which furnished my material were cases of dengue,

and I bring these observations forward in the hope that during the recrudescence of the disease which will in all probability occur next hot weather, they may be confirmed and established as of assistance in determining whether "Three-Day Fever" and "Seven-Day Fever" are forms of endemic dengue or unrelated diseases.

I have not had the good fortune to see a series of cases of Seven-Day Fever, but concerning Three-Day Fever I have some observations to offer. In 1908 and 1909 I was stationed in Dehra Dun, and had the opportunity of seeing a large number of cases of three-day fever which occurred each year during the hot weather, and I was informed that a similar fever had been observed during the hot weather of 1907. Soon after the monsoon broke, malaria made its appearance and the number of malarial cases increased steadily as the autumn advanced, the other type of fever gradually disappearing. Of course along with the cases of three-day fever there were numerous cases of malarial relapses, fevers due to chills, sore throats, etc., and the number of cases being very large, it was not possible to make microscopical examinations for parasites and blood counts in more than a small proportion, so that an exact diagnosis was not made in many cases. One fact in the distribution of the cases amongst the garrison was apparent from the start. The majority of the cases of three-day fever occurred amongst the 9th Gurkhas, a regiment which had recently arrived from Lansdowne, whereas the 2nd Gurkhas, who were permanently stationed in Dehra Dun, and the two batteries of Mountain Artillery, which were recruited from the Punjab, remained comparatively free. This is what one would expect if three-day fever is, as now appears to be the case, endemic in the plains of Upper India. Regiments newly arrived from the hills would suffer the heaviest, those recruited in the plains or permanently stationed there having become comparatively immune. It was during the course of routine examinations of the blood of fever cases that I lighted upon this postfebrile eosinophilia in numerous cases of fever in which malarial parasites and increase of large mononuclears were absent. I give here a few of the blood counts.

No. 1 Recruit. No previous admission for malaria. Fever lasted 5 days. No parasites.

1st Count, 3rd day—

Polymorphonuclears	...	19	per cent.
Large Mononuclears	..	14	"
Lymphocytes	...	60	"
Eosinophiles	...	7	"

2nd Count, 10th day—

Polymorphonuclears	...	62	per cent.
Large Mononuclears	...	12	"
Lymphocytes	...	14	"
Eosinophiles	...	12	"

No. 2 Recruit. No previous admission for malaria.
Fever lasted 3 days. No parasites.

1st Count, 2nd day—

Polymorphonuclears	...	78	per cent.
Large Mononuclears	...	14	"
Lymphocytes	...	8	"
Eosinophiles	...	0	"

2nd Count, 9th day—

Polymorphonuclears	...	47.5	per cent.
Large Mononuclears	...	16	"
Lymphocytes	...	16.5	"
Eosinophiles	...	20	"

3rd Count, 39th Day—

Polymorphonuclears	...	48.5	per cent.
Large Mononuclears	...	8.5	"
Lymphocytes	...	17	"
Eosinophiles	...	26	"

No. 3. Rifleman, 2 years' service. No admission for
fever for past 6 months. Fever lasted 4 days. No
parasites.

1st Count, 2nd day—

Polymorphonuclears	...	79	per cent.
Large Mononuclears	...	10	"
Lymphocytes	...	10	"
Eosinophiles	...	1	"

2nd Count, 9th day—

Polymorphonuclears	...	60.5	per cent.
Large Mononuclears	...	8.5	"
Lymphocytes	...	17	"
Eosinophiles	...	14	"

3rd Count, 19th day—

Polymorphonuclears	...	54.5 per cent.
Large Mononuclears	...	10 "
Lymphocytes	...	22.5 "
Eosinophiles	...	13 "

No. 4 Recruit. No previous admission for malaria.
Fever lasted 4 days.

1st Count, 3rd day—

Polymorphonuclears	...	49.5 per cent.
Large Mononuclears	...	10 "
Lymphocytes	...	37 "
Eosinophiles	...	3.5 "

2nd Count, 12th day—

Polymorphonuclears	...	43.5 per cent.
Large Mononuclears	...	9.5 "
Lymphocytes	...	34 "
Eosinophiles	...	13 "

No. 5 Recruit. Fever lasted 3 days. Chart XIV.

1st Count, 4th day—

Polymorphonuclears	...	61.5 per cent.
Large Mononuclears	...	7 "
Lymphocytes	...	30 "
Eosinophiles	...	1.5 "

2nd Count, 7th day—

Polymorphonuclears	...	55 per cent.
Large Mononuclears	...	6 "
Lymphocytes	...	23 "
Eosinophiles	...	16 "

No. 6 Recruit. Fever lasted 3 days. Chart XV.

Count 6th day—

Polymorphonuclears	...	65 per cent.
Large Mononuclears	...	8 "
Lymphocytes	...	26 "
Eosinophiles	...	7 "

No. 7 Recruit. Fever lasted 3 days. Chart XVI.

1st Count, 4th day—

Polymorphonuclears	...	82 per cent.
Large Mononuclears	...	12 "
Lymphocytes	...	6 "
Eosinophiles	...	0 "

2nd Count, 6th day—

Polymorphonuclears	...	64	per cent.
Large Mononuclears	...	8	"
Lymphocytes	...	21.5	"
Eosinophiles	...	6.5	"

No. 8 Recruit. Fever lasted 4 days. Chart XVII.

Count 5th day—

Polymorphonuclears	...	45	per cent.
Large Mononuclears	...	12	"
Lymphocytes	...	32	"
Eosinophiles	...	11	"

No. 9 Recruit. Fever lasted 3 days. Chart XVIII.

Count 4th day—

Polymorphonuclears	...	63	per cent.
Large Mononuclears	...	9	"
Lymphocytes	...	24	"
Eosinophiles	...	4	"

These few observations are the only ones that I have preserved in my notes. The occurrence of eosinophilia appeared to me at the time to be of academical but of no particular practical interest, hence I did not follow up the point and establish it by a large number of observations. But when I found the same phenomenon in a series of cases of undoubted dengue, its bearing on the question of the identity of these fevers became at once apparent, and I publish these observations in the hope that they may be found to be of some use in the settlement of this question.



THE DIFFERENTIAL BLOOD COUNT IN DENGUE.

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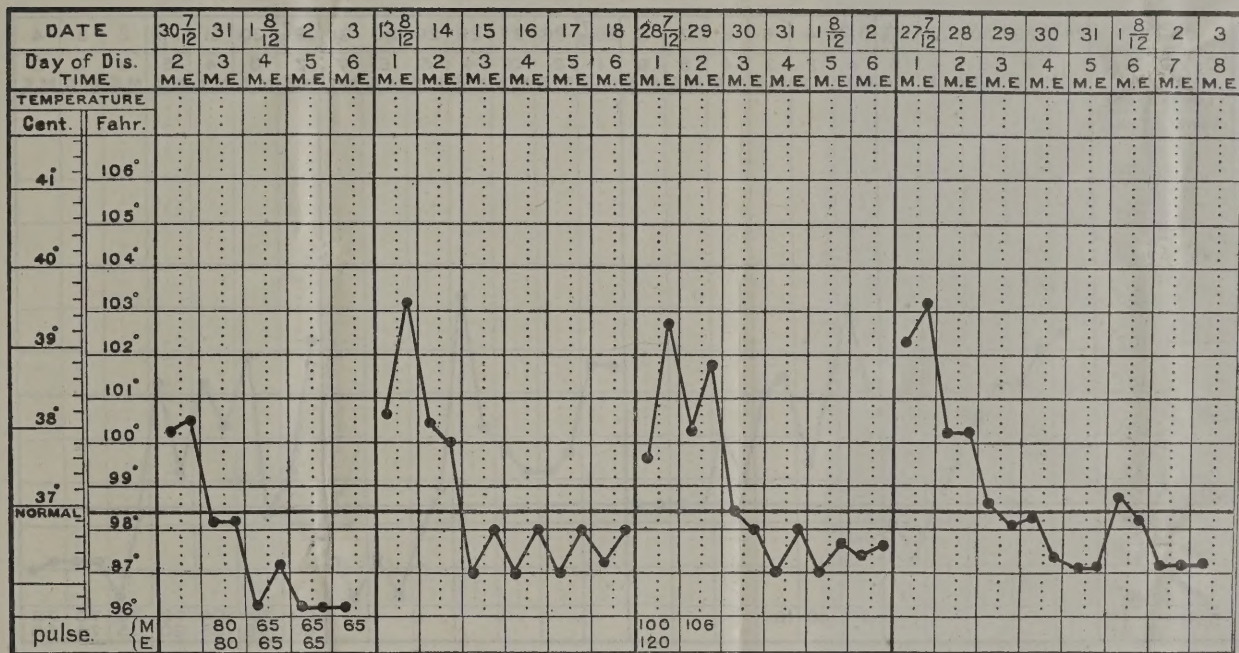
CHARTS.

I.

II.

III.

IV.

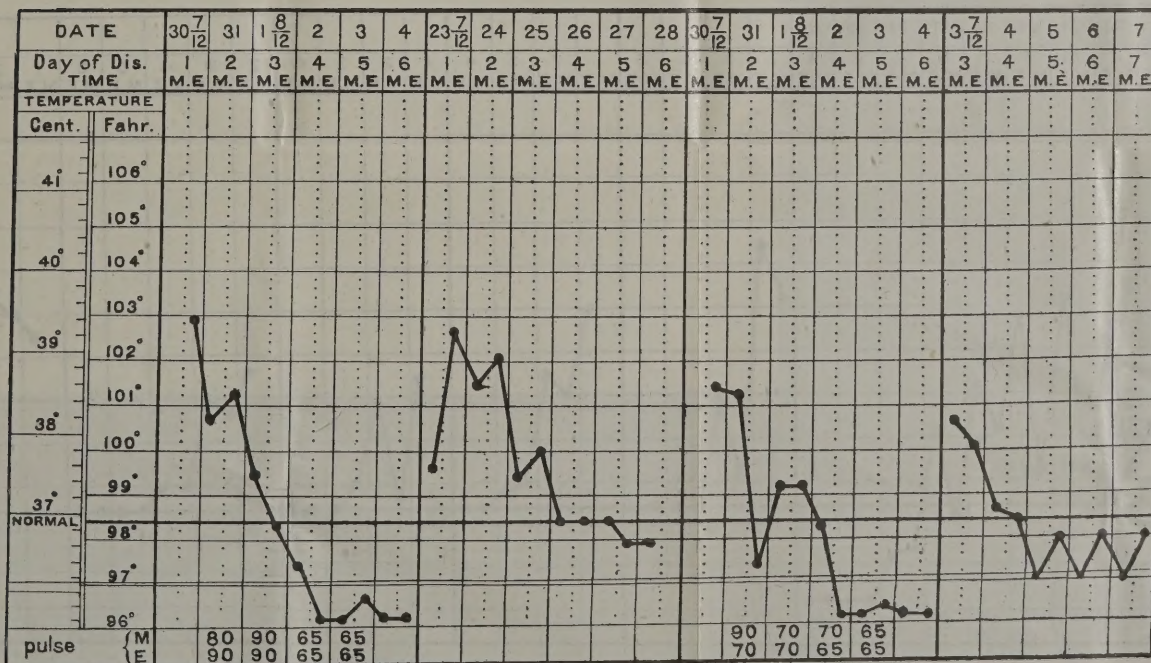


V.

VI.

VII.

VIII.



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XII.

